No Evidence of Excess Ground-Atmosphere Interchange at Martian Snowpack Sites

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Knowledge of the current hydrological cycle on Mars is critical to accurate climate modeling of Mars, and to understanding results of both geologic tests and possible future life searches. The photographic identification of suspected dust-covered snowpacks on Mars begs the question of whether these snowpacks have a connection to the current hydrological cycle on Mars, or whether they are simply inert remnants of a previous climate. Although their coverings of dust make it likely that they are not currently being deposited, it is possible that they are still interacting by releasing water vapor to the atmosphere during warm seasons. We used the TES instrument aboard Mars Odyssey to monitor changing water vapor levels within 1° of 224 suspected snowpack sites, watching for sudden increases in water vapor levels, particularly changes that were not coordinated with overall changes to the surrounding areas.

Only two sites, both in the southern hemisphere, showed signs of unusual increases, and both of these were found to be part of regional patterns. Because coverage of any particular single spot on the Martian surface can contain gaps many Martian days in length, and the footprint of the TES instrument (3 km wide) is large compared to the size of the snowpacks themselves, we cannot conclusively state that there is no current excess interaction with the Martian atmosphere. However, none of the sites studied seem to be interacting above the background level of the surrounding regolith at the current time.